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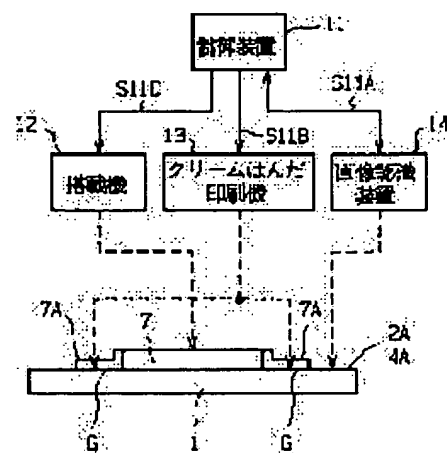
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(54) APPARATUS AND METHOD FOR MOUNTING SURFACE COMPONENT

(57)Abstract:

PURPOSE: To mount a component on the surface so as to be brought closer to the center of the coating position of creamy solder by a method wherein a mounting target position which is obtained on the basis of a first recognition mark is corrected by a mounting target position which is obtained on the basis of a second recognition mark formed by printing creamy solder.

CONSTITUTION: On the basis of a pattern mark 2A which has been formed in advance on a board 1, the position of a land is detected, and solder pastes 6 are coated. At this time, a paste mark 4A is coated simultaneously, the position of the paste mark 4A is detected, and the error of printing positions with reference to the land of the solder pastes 6 is computed on the basis of a detected result. Then, by using $1/2$ of the error as a correction amount, positional data on the land by the pattern mark 2A is corrected, and leads 7A for an electronic component 7 are mounted on the lands 6 on the basis of a corrected result. As a result, it is avoided that the leads 7A mounted on the solder pastes 6 are brought too close to solder pastes which are adjacent.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Table of Contents] This invention is explained in order of the following.

The technique of the Field of the Invention former (drawing 6 - drawing 8)

Object of the Invention (drawing 6 - drawing 8)

The means for solving a technical problem (drawing 1 - drawing 3)

Operation (drawing 1 - drawing 3)

Example (drawing 1 - drawing 5)

Effect-of-the-invention [0002]

[Industrial Application] This invention is applied to the surface component-mounting equipment and the surface component-mounting approach of mounting electronic parts in the circuit board, concerning surface component-mounting equipment and the surface component-mounting approach, and is suitable.

[0003]

[Description of the Prior Art] Conventionally, in the surface component-mounting equipment which mounts electronic parts etc. on the circuit board, the mark for alignment by at least two or more image processings is prepared on a substrate; automatic alignment of a screen and the substrate is carried out in a cream solder printing machine, and it is made as [perform / in an element-placement machine / to the substrate concerned / the element placement by location amendment of components].

[0004] In this case, as shown in drawing 6 , location **** is carried out for pattern mark 2A and 2B which were formed on the substrate 1 according to image recognition, and it is made as [connect / to the land formed on the substrate 1 / lead (electrode) 7A of electronic parts 7].

[0005]

[Problem(s) to be Solved by the Invention] By the way, for lead 7A of the electronic parts 7 therefore carried in the substrate 1 concerned at the densification of a substrate, the pitch is abbreviation. A problem with it difficult [to perform highly precise soldering corresponding to the lead of the **** pitch concerned therefore] for the contraction error of a substrate pattern, the instrumental error of the mounting machine itself, an image recognition error, etc. when it is ****-ized below 0.3 [mm] and therefore mounts the lead of such a **** pitch in soldering is *****.

[0006] That is, as shown in drawing 7 , therefore, the solder paste (cream solder) 6 as pretreatment of soldering is applied to a printing machine to the land 5 formed on the substrate 1. in this case, the printing position of solder paste 6 is made as [make / them / into it / therefore, recognize pattern mark 2A and 2B which were mentioned above about drawing 6 to an image processing, they carry out location appearance to it, and].

[0007] However, therefore, an error arises in the printing position of a land 5 and solder paste 6 for an image recognition error and an instrumental error, the pattern contraction error of a substrate, the screen at the time of printing, the gap error of a substrate, etc.

[0008] although a loading machine is used and electrode 7A of electronic parts 7 is carried on the solder paste 6 printed on the substrate 1 as furthermore shown in drawing 8 , it is made as [make / therefore, / it / it / carry out location appearance of the helicopter loading site concerned to carrying out the image recognition of pattern mark 2A and 2B which were mentioned above about drawing 6 in this case, and], and, therefore, a gap arises in an image recognition error, an instrumental error, etc. also in this case at a helicopter loading site.

[0009] Therefore, the problem which produces a solder bridge in order that lead 7A which adjoined each solder paste 6 to the lead which should connect essentially may approach each solder paste 6 concerned too much, if the printing position of solder paste 6 and the helicopter loading site of lead 7A shift to hard flow, respectively is *****.

[0010] This invention was made in consideration of the above point, and tends to propose the surface component-mounting equipment and the surface component-mounting approach of realizing soldering of the components of a ****

pitch with the sufficient yield.

[0011]

[Means for Solving the Problem] In order to solve this technical problem, it sets to this invention. In the surface component-mounting approach of mounting the surface components 7 (7A) in the mounting target position 5 on the predetermined substrate 1 Based on 1st recognition mark 2A formed on the substrate 1, and 2B, detect the mounting target position 5 of the surface components 7 (7A), and while applying the cream solder 6 to the mounting target position 5 based on the detected mounting target position Cream solder is applied to the predetermined location on a substrate 1. 2nd recognition mark 4A, 4B is formed, and based on the location of the 2nd recognition mark 4A and 4B, the mounting target position obtained from 1st recognition mark 2A and 2B is amended, and it is made to mount the surface components 7 (7A) on a substrate 1 based on the amended mounting target position.

[0012] In this invention moreover, the surface component-mounting approach While detecting the location of 1st recognition mark 2A of a substrate 1, and 2B, positioning a substrate 1 based on a detection result and applying cream solder to the mounting target position 6 of the positioned substrate 1 Therefore, to apply cream solder to the predetermined location of a substrate 1 2nd recognition mark 4A, Form 4B and the mounting target position 5 is detected based on 1st recognition mark 2A and 2B. The spreading location of the cream solder 6 is detected based on the 2nd recognition mark 4A and 4B, and a mounting target position is amended based on the spreading location of the cream solder 6, and it is made to mount the surface components 7 (7A) on a substrate 1 based on the amended mounting target position.

[0013] Moreover, in this invention, it sets to the surface component-mounting equipment 10 which mounts the surface components 7 (7A) in the mounting target position 5 on the predetermined substrate 1. the 1st recognition mark 2A and 2B formed on the substrate 1, while applying the cream solder 6 to the mounting target position 5 based on the mounting target position 5 of the surface components 7 (7A) therefore detected Cream solder is applied to the predetermined location on a substrate 1. 2nd recognition mark 4A, It has the cream solder printing machine 13 which forms 4B, a mounting target position is amended based on the 2nd recognition mark 4A and 4B, and it is made to mount the surface components 7 (7A) on a substrate 1 based on the amended mounting target position concerned.

[0014] Moreover, in this invention, it sets to the surface component-mounting equipment 10 which mounts the surface components 7 (7A) in the mounting target position 5 on the predetermined substrate 1. the 1st recognition mark 2A and 2B formed on the substrate 1, while applying the cream solder 6 to a mounting target position based on the mounting target position of the surface components 7 (7A) therefore detected As opposed to the substrate 1 which formed the 2nd recognition mark 4A and 4B by applying cream solder to the predetermined location on a substrate 1 The mounting target position 5 obtained from 1st recognition mark 2A and 2B 2nd recognition mark 4A, Amend based on the location of 4B and it has the loading machine 12 which carries the surface components 7 (7A) on a substrate 1 based on the amended mounting target position concerned. Therefore, it is made to carry out mounting immobilization of the surface components 7 (7A) on a substrate 1 carrying out reflow processing of the substrate 1 which therefore carried the surface components 7 (7A) in the loading machine 12.

[0015]

[Function] By therefore amending the mounting target position obtained based on 1st recognition mark 2A and 2B to the mounting target position obtained based on the 2nd recognition mark 4A and 4B therefore formed in printing cream solder, the surface components 7 (7A) can be brought close to the core of the spreading location of the cream solder 6 much more, and can be carried in it.

[0016]

[Example] About a drawing, one example of this invention is explained in full detail below.

[0017] In drawing 1 which attaches and shows the same sign to a corresponding point with drawing 8, 10 shows surface component-mounting equipment as a whole. The image recognition of pattern mark 2A on a substrate 1 and the 2B is carried out. A substrate 1 On the image recognition equipment 14 to position and a substrate 1, cream solder It is made as [control / by the control unit 11 / , respectively / the loading machine 12 which therefore equips with the electronic parts concerned on a substrate 1 that the lead of electronic parts carries (solder paste) in the location where the cream solder printing machine 13 and solder paste which carry out printing spreading were applied / therefore].

[0018] Moreover, drawing 2 shows the mounting procedure of the electronic parts in surface component-mounting equipment 10. From a step SP 1, a control unit 11 goes into the procedure concerned, and feeds a substrate (PCB) 1 into the cream solder printing machine 13 in a step SP 2. Furthermore in a step SP 3, a control unit 11 by sending out control signal S11A to image recognition equipment 14 Image recognition is picturized and carried out. therefore, the image recognition equipment 14 concerned pattern mark 2A and 2B which were formed in the front face of a substrate 1 as shown in drawing 2 to an image pick-up camera The screen used for a substrate 1 and printing from pattern mark 2A and 2B based on the result of the image recognition concerned in the continuing step SP 4 is positioned.

[0019] Moreover, by sending out control signal S11B to the cream solder printing machine 13 in a step SP 5, a control

unit 11 carries out printing spreading of the solder paste 6 in the lead stowed position (land) of electronic parts to the substrate 1 positioned based on pattern mark 2A and 2B (drawing 3). In case opening is prepared in the screen (not shown) used in the presswork concerned at this time and solder paste 6 is applied to a lead stowed position, it bundles up with this and printing spreading of the paste marks 4A and 4B is carried out (drawing 3). However, it is made not to apply solder paste to pattern mark 2A and 2B.

[0020] Drawing 4 shows the condition of having carried out printing spreading of the solder paste 6 to the land 5 formed on the substrate 1, and, therefore, an error produces it in an image recognition error, an instrumental error, etc. here in the printing position. In this condition, a control unit 11 discharges a substrate 1 from the ***** cream solder printing machine 13 at a step SP 6, and feeds the substrate 1 concerned into the electronic-parts loading machine 13 in step SP 7.

[0021] In a step SP 8, a control unit 11 computes the helicopter loading site of electronic parts 7 which therefore carries pattern mark 2A and 2B which were formed in the substrate 1 an image pick-up and by carrying out image recognition at image recognition equipment 14 in the land 5 on [the location of the pattern mark 2A concerned and 2B to] a substrate 1. Furthermore, a control unit 11 carries out the image recognition of the paste marks 4A and 4B (drawing 3) applied in the above-mentioned step SP 5 in the continuing step SP 9, and detects the location.

[0022] Furthermore, a control unit 11 computes the error amount to the design value of the printing position of the paste marks 4A and 4B when being based on ***** pattern mark 2A and 2B to a step SP 10. In addition, let physical relationship on the design of pattern mark 2A and 2B, and the paste marks 4A and 4B be a known thing.

[0023] Thus, when the error amount of the computed paste marks 4A and 4B becomes being the same as that of the printing error amount of the paste mark 6 by which printing spreading was carried out on the land 5, a control unit 11 is added to the helicopter loading site of the electronic parts computed in the above-mentioned step SP 8 by making one half of the computed error amounts concerned into the amount of amendments, and obtains the helicopter-loading-site data of electronic parts 7.

[0024] Incidentally, in drawing 4 , a center line 8 expresses the center of the land 5 computed in the above-mentioned step SP 8, a center line 9 expresses the center of the solder paste 6 computed in the above-mentioned step SP 9, and a center line 10 expresses the center of the helicopter loading site computed in the above-mentioned step SP 10.

[0025] Thus, based on the obtained helicopter-loading-site data, as a control unit 11 carries lead 7A of electronic parts 7 in the land 5 which corresponds, respectively in a step SP 11, it equips with the electronic parts 7 concerned on a substrate 1 (drawing 5), and it discharges a substrate 1 from the electronic-parts loading machine 12 in a step SP 12.

[0026] Furthermore by carrying out reflow processing of the substrate 1 concerned in a reflow means (not shown), a control unit 11 can fix to the land 5 on the substrate 1 concerned lead 7A of the electronic parts 7 carried on the substrate 1.

[0027] In the above configuration, surface component-mounting equipment 10 detects the location of a land 5 based on pattern mark 2A and 2B which were beforehand formed in the substrate 1, and applies solder paste 6 based on the detection result concerned.

[0028] While applying the paste marks 4A and 4B to coincidence at this time, the location of the paste marks 4A and 4B concerned is detected, and based on the detection result concerned, the error of the printing position to the land 5 of solder paste 6 is computed.

[0029] The location data of the land 5 based on pattern mark 2A and 2B are amended by making one half of these errors into the amount of amendments, and lead 7A of electronic parts 7 is carried in a land 5 based on the amendment result concerned.

[0030] As a result, the helicopter loading site concerned is amended so that the core of the spreading location of the solder paste 6 concerned may be approached according to the amount of gaps and the gap direction over a land 5 of a spreading location of solder paste 6, and it can avoid approaching too much the solder paste 6 with which lead 7A which should be carried in predetermined solder paste 6 adjoins to the solder paste 6 concerned.

[0031] Therefore, according to the above configuration, the defect by the solder bridge by approaching too much the solder paste 6 with which lead 7A which should be carried in predetermined solder paste 6 adjoins to the solder paste 6 concerned etc. can be markedly reduced on a target.

[0032] In addition, what is necessary is just to make it this invention, amend the helicopter loading site of lead 7A in the spreading location direction of solder paste 6 in short in addition to this in an above-mentioned example, although the case where one half of the errors of the spreading location of the solder paste 6 to a land 5 was made into the amount of amendments was described.

[0033] Moreover, in an above-mentioned example, although the case where pattern mark 2A and 2B, and two paste marks 4A and 4B were formed, respectively was described, two or more this inventions can acquire the same effectiveness as an above-mentioned case, if it is made to prepare in short not only in this.

[0034] In a further above-mentioned example, although the case where lead 7A of electronic parts 7 was mounted in a

land 5 was described, this invention is widely applicable not only to this but the mounting equipment which mounts minute components in a predetermined member front face in short.

[0035]

[Effect of the Invention] According to this invention, the surface component-mounting equipment and the surface component-mounting approach of mounting surface components with a sufficient precision much more are realizable as mentioned above by deciding the printing position based on the recognition mark on a substrate, printing cream solder, and having computed the mounting position of surface components based on the printing position of the cream solder concerned, and the location of a recognition mark.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the surface component-mounting equipment by this invention.

[Drawing 2] It is the flow chart which shows the mounting procedure by this invention.

[Drawing 3] It is the top view showing the printing condition of solder paste.

[Drawing 4] It is the partial enlarged drawing showing the printing condition of solder paste.

[Drawing 5] It is the partial enlarged drawing showing the loading condition of electronic parts.

[Drawing 6] It is the top view showing the conventional electronic-parts loading condition.

[Drawing 7] It is the partial enlarged drawing showing the printing condition of conventional solder paste.

[Drawing 8] It is the partial enlarged drawing showing the conventional electronic-parts loading condition.

[Description of Notations]

1 [.. A land, 6 / .. Solder paste, 7 / .. Electronic parts, 7A / .. A lead, 11 / .. A control unit, 12 / .. A loading machine, 13 / .. A cream solder printing machine, 14 / .. Image recognition equipment] A substrate, 2A, 2B .. A pattern mark, 4A, 4B .. A paste mark, 5

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DRAWINGS

[Drawing 1]

10

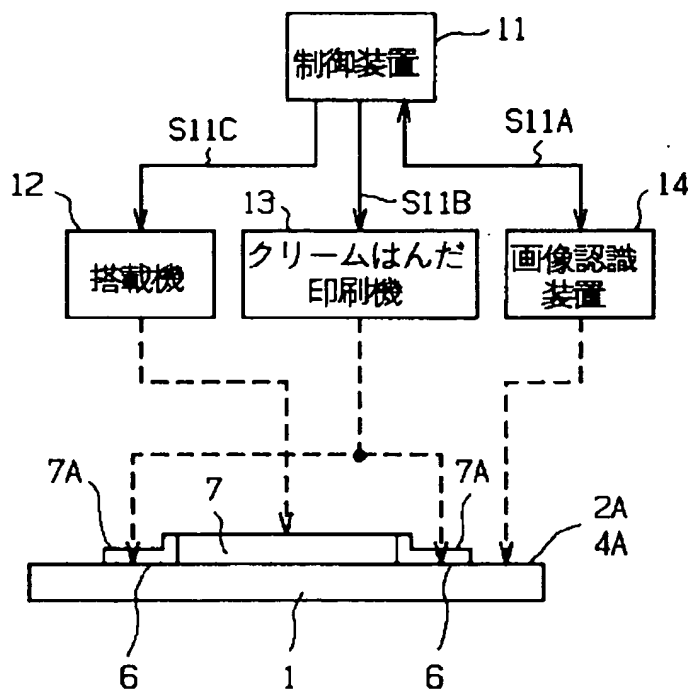


図1 実施例の構成

[Drawing 2]

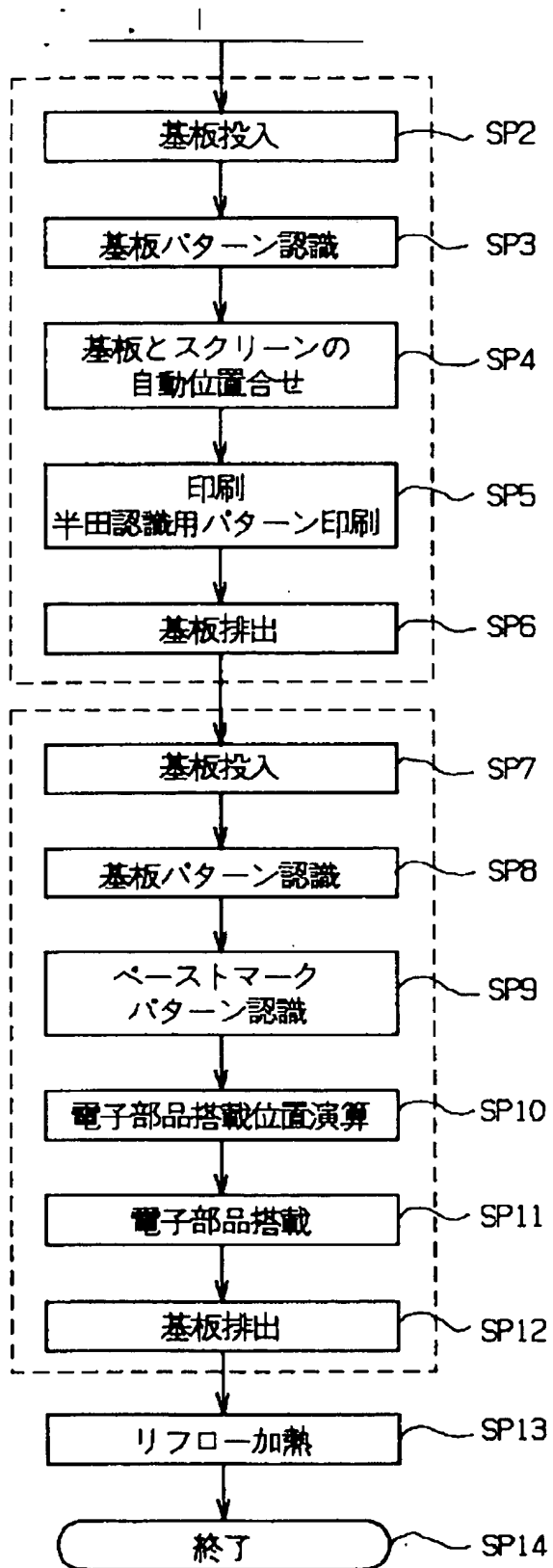


図2 実装処理手順

[Drawing 3]

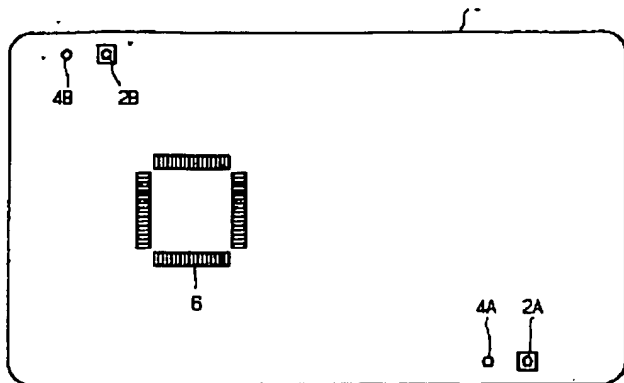


図3 ソルダペーストの印刷

[Drawing 4]

1

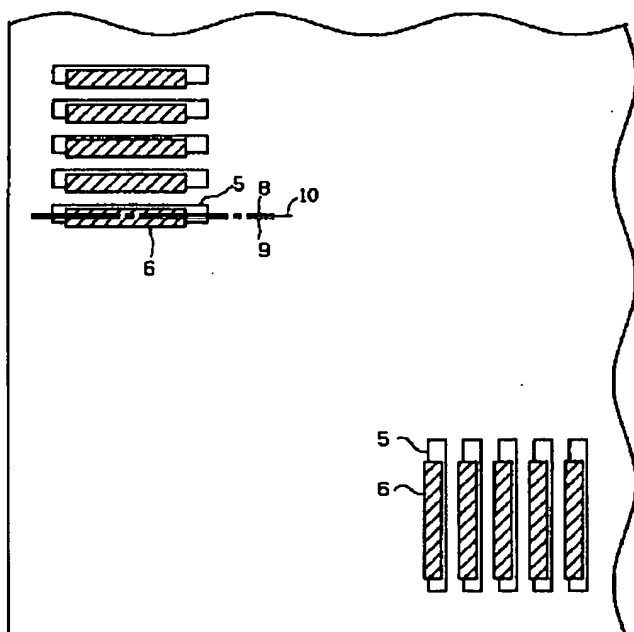


図4 ソルダペーストの印刷

[Drawing 5]

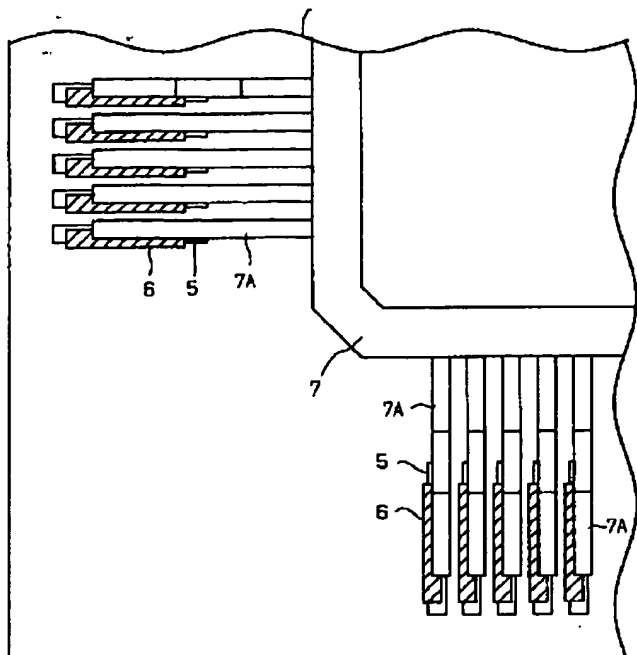


図5 電子部品の搭載状態

[Drawing 6]

PA

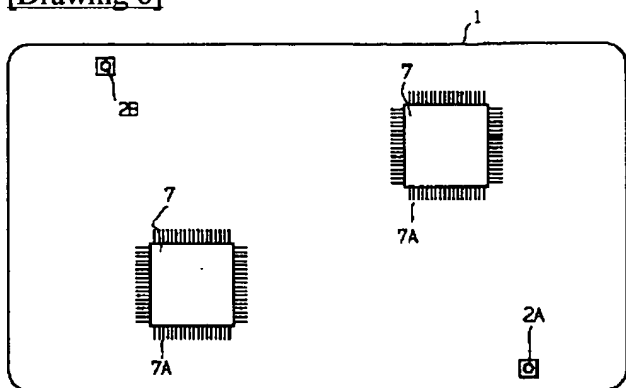


図6 従来例

[Drawing 7]

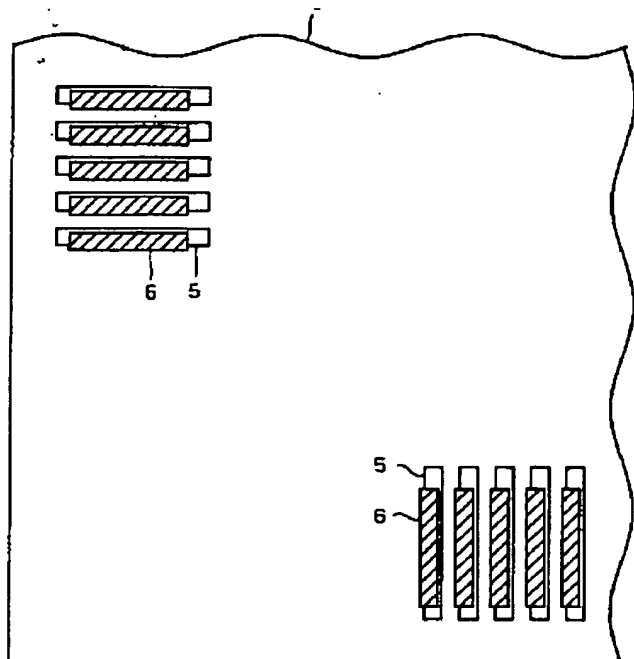


図7 従来例

[Drawing 8]

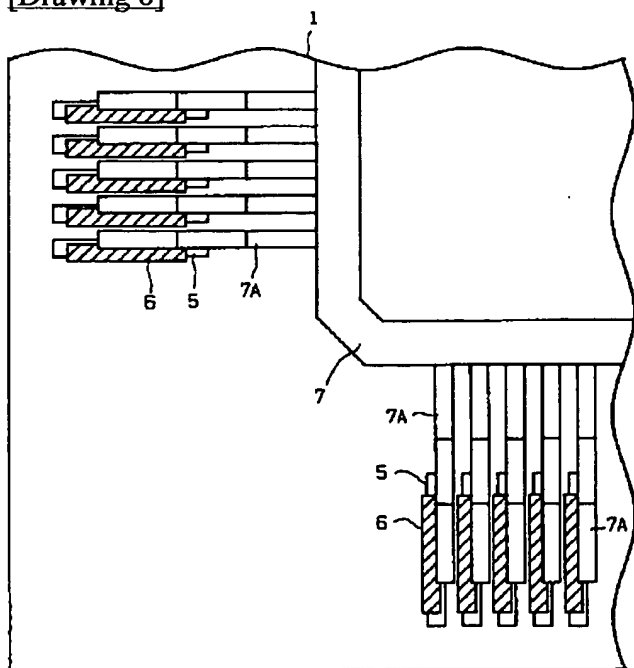


図8 従来例

[Translation done.]